EXHIBIT F

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK
CASE NO. 1:17-cv-00124-LLS

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FEDERAL TRADE COMMISSION and

THE PEOPLE OF THE STATE OF NEW YORK, by LETITIA JAMES, Attorney General of the State of New York,

Plaintiffs,

v.

QUINCY BIOSCIENCE HOLDING COMPANY, INC., a corporation;

QUINCY BIOSCIENCE, LLC, a limited liability company;

PREVAGEN, INC., a corporation d/b/a SUGAR RIVER SUPPLEMENTS;

QUINCY BIOSCIENCE MANUFACTURING LLC, a limited liability company; and

MARK UNDERWOOD, individual and as an officer of QUINCY BIOSCIENCE HOLDING COMPANY, INC., QUINCY BIOSCIENCE, LLC, and PREVAGEN, INC.,

Defendants.

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REMOTE VIDEOTAPED DEPOSITION OF
JEREMY M. BERG, Ph.D
October 8, 2021

Reported by:

Maureen Broderick, RPR

JOB NO. 200431

October 8, 2021
10:04 a.m.

Remote videotaped deposition of JEREMY M. BERG, Ph.D., taken via Zoom, before Maureen E. Broderick, Registered Professional Reporter and Notary Public in and of the Commonwealth of Pennsylvania.

APPEARANCES:

ALL ATTENDEES PRESENT VIA ZOOM

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ALSO PRESENT: William Ducklow, Investigator
Philip Rizzuti, Videographer
Jane Azia (Briefly joined)

that protein. And so we did some studies about that. And iron, you know, was, again, earlier in my, more earlier in my career, more on the chemical side.

Q Is it fair to say that you primarily studied proteins at the cellular level?

A More, I would say it's more accurate to say mostly we worked on isolated proteins. So not even at the cellular level, but purified proteins.

Q And so that's, that would be in contrast of studying whole organisms, right?

A That's right. We did do a few things with whole organisms, but not very much.

Q Okay. And your primary research focus does not include human physiology, right?

A Not direct studies of humans, but certainly the studies were related to the physiological functions of proteins in humans, some proteins in humans.

Q And your primary research focus as you described it does not include protein digestion, right?

A Not the primary focus, although we have done some studies that are related to protein

digestion.

Q I'm sorry. You said you did, done some -- what?

A We did do one study in particular that was, that included a substantial focus on protein digestion.

Q And what study was that?

A It was a study of an iron-containing protein that we -- if you put in my, put in the report, I can identify the particular paper. We examined a naturally occurring iron-containing protein and compared it to the same protein synthesized out of the D-amino acids as opposed to normal amino acids and looked at the difference in how long they survived in the body in mice.

Q I'm sorry. You said earlier that, that your work on iron was early in your career. Was that study early in your career?

A No. This was later. Sorry. There were, there were two points where I did iron, both early in my career, and then this one study where we worked on the different iron-containing protein.

Q Now, you didn't mention it, but I saw from your CV that you were also for a while the editor in

Q You were asked to assume that by counsel?

A I don't think I was asked one way or another.

Q The scope also goes on to say that you were asked to opine on other possible mechanisms by which Prevagen could have an effect; is that right?

A Yes.

Q So is it fair to say that your report is about mechanisms of action? Is that right?

A It's a discussion of possible or proposed mechanisms of action, yes.

Q Okay. And prior to this engagement, had you done any work on, on mechanisms of action for any drug or, or dietary supplement before?

A My previous comments about potential roles of zinc falls into that characterization, I would say. But I'm trying to think if there are any other, other examples. I believe that's the only one.

Q You say that, in your report that you were asked to opine on these questions based on your expertise in the field.

Do you see that?

A Yeah, I see that.

Q What is "the field"?

A In this context, I would say the field is biochemistry, physiology, pharmacology.

Q And I'm not going to touch biochemistry, because I understand that's your primary area. Are you an expert in pharmacology?

A In some aspects of pharmacology, yes.

Q Okay. Are you a pharmacologist?

A I am not.

Q What areas of pharmacology are you an expert in?

A Based on, largely based on my time at NIH, mechanisms of drug action, pharmacogenomics are the primary ones.

Q You also said physiology; is that right?

A I did.

Q Okay. And you're an expert in physiology?

A Again, in some aspects.

(Jane Azia joins remotely for brief time.)

BY MR. de LEEUW:

Q What aspects of physiology are you an expert in?

A General, general topics related to

metabolism, both in normal and in some, you know, some disease states.

Q And where did you gain this expertise?

A I didn't mention it earlier, but I've also been, going on 20-odd years now, been the lead author of a biochemistry textbook, which includes fairly detailed coverage of principals of metabolism.

Q And in terms of going back to pharmacology, you said that you consider yourself an expert in drug actions and mechanisms; is that right?

A I said mechanisms of drug actions and pharmacogenomics, yes.

Q And you said that you gained that expertise while you were at the NIH; is that right?

A I certainly had some of it before related to spending time at, doing research and teaching and interacting with people at medical schools. But then at NIH when I was responsible for overseeing the programs, my degree of familiarity increased.

Q So your degree of familiarity increased. Did you publish any studies on the mechanisms of drug actions?

A I do.

Q Okay. And when you say "the experts in the relevant scientific fields," what are the relevant scientific fields?

A So the fields related to the drug development or supplement efficacy. I mean, the point I was trying to make is that for a number of reasons, there's great interest in the use of proteins, specific proteins as, as drugs were in other functions.

And there, it would be beneficial both for individuals and for commerce if the materials could be delivered orally, but they're not because of the problems that I discuss in the report.

Q I get that. I just, I'd like to know -- and we'll get into that in a little bit. You said "the experts in the relevant scientific fields." I just want to know what the relevant scientific fields are.

A You know, I think if this claim were -- a claim like this, I think biochemists, pharmacologists, neuroscientists would all be intrigued and eager to see evidence, physiologists,

physicians.

Q You said earlier that there are people studying the use of proteins for, as drugs or other, for other benefits; is that right?

A Yes.

Q In fact, there's a lot of them, a lot of studies that relate to trying to use proteins as, for, as either drugs or as supplements; is that right?

A There are certainly lots of studies as proteins as drugs. I don't know so much about supplements, but yes.

Q When you said the, when you said "experts in the relevant scientific fields," which of those fields do you consider yourself an expert in?

A In the context of this statement, I would say, you know, certainly biochemistry, but also pharmacology.

Q Now, for those other fields that you mentioned, did you speak to any other experts about what evidence they would require?

A Not in this context. But I've been involved in conversations over decades about proteins as drugs, or the possibility of proteins as

drugs. Indeed that was one of the, the paper that I mentioned was -- that I had done previously on protein degradation in mice was related to that question.

Q Actually, because you have your report in front of you now, can you look and tell me which article that was or which study that was?

A It's reference 60 in my CV.

Q It's called: A comparison of the -- I'm going to get these words --

(Reporter clarification.)

THE WITNESS: A comparison of the immunogenicity of protein enantiomers.

BY MR. de LEEUW:

Q You did that work in 1993?

A The paper was published in 1993, yes.

Q What role did you -- I notice that there's a number of authors of that article. What role did you play in that article?

A I conceived of the experiment, and I was not involved directly in the experimental studies.

Q So the other listed authors conducted the study; is that right?

A The primary, primary research -- the

primary experimental work was done by Dr. Simer [ph] and Dr. Howard Densis [ph].

Q And that was -- I'm bad at math -- but 28 years ago; is that right?

A Something like that, yeah.

Q And is it fair to say that our knowledge about, about proteins has grown in the last 28 years?

A That's true, although the -- yes.

Q I hope so.

All right. So getting back to the report, you said in paragraph ten, you say: As a protein, apoaequorin would be expected to degrade into amino acids and possibly some small peptides in the stomach.

Do you see that?

A I do.

Q Okay. Is that true of all proteins?

A It's true of the great majority of proteins, yes. Not of all proteins but of the great majority of proteins.

Q What types of proteins aren't degraded into amino acids and small peptides in the stomach?

A There are some proteins that are more

resistant to degradation in the, in the stomach. They tend to be proteins that function extracellularly -- that is, they function outside the cell rather than inside the cell -- so that there are, you know, there are biological reasons that they need to be more robust and more resistant.

Q You said, you go on to say: Therefore -- and the "it" here is apoaequorin -- could not enter the bloodstream as an intact protein.

Do you see that?

A Yes.

Q And are you a hundred percent certain of that?

A The only qualification that I would add to any is, to any appreciable extent -- I mean, I can't rule out that a tiny amount could get in, but...

Q And you haven't personally done any experiments to determine whether or not any intact apoaequorin could get into the bloodstream; is that fair to say?

A I have not personally done those experiments -- any experiments.

Q Is it also possible that large peptides from apoaequorin could enter the bloodstream?

A Again, anything in possible. But as I stated, as I discuss later in the report, there's no evidence that that's the case. And one would be, based on the behavior of most proteins, one would be surprised if that were true.

Q You're not an expert on human digestion, are you?

A I'm not an expert on human digestion. I am an expert on sort of general characteristics of digestion.

Q Do you understand different people digest things differently? Do you understand that?

A Yes, I do understand that.

Q You're not a gastroenterologist, right?

A I am not.

Q I may have asked this, but you didn't conduct any digestion studies on Prevagen or apoaequorin, right?

A I did not.

Q And you cite the Goodman study for the proposition that apoaequorin is rapidly digested in the stomach; is that right?

A What --

Q This is in paragraph 11 of your report.

Q What's the other one?

A The other is that if there were a peptide that -- if there were a peptide that were derived from apoaequorin that had some biological activity, one, it would be common to many other proteins; but two, there's no, no biological context why that would likely to have evolved.

Q And in that paragraph, I don't see where you're talking about the evolutionary theory.

A I'll have to...

Q You end that section by saying: In addition, Quincy Bioscience does not appear to have made any attempt --

A Right.

Q -- to identify or characterize any such degradation products despite the availability of methods.

Do you see that?

A Yeah. It may, it may actually be in my other report. I'll have to look for it.

Q Okay. And what's -- when you say "the availability of methods," what methods are you referring to?

A There are a variety of methods for looking

at the degradation products of a protein with much more resolution than the gel method that was used in the Goodman experiment. So (inaudible).

COURT REPORTER: Say it again.

THE WITNESS: High-performance liquid chromatography and mass spectrometry where you can fractionate. You can separate all the products of degradation into many more separate entities from amino acids to peptides and then identify what they are based on their, by their mass.

BY MR. de LEEUW:

Q Were you asked to perform those experiments?

A I was not.

Q Is that something that you could do?

A I don't currently have a laboratory, so no. But in the past, that would have been something that I could have done.

Q Have you ever done those, that type of experiment with any compound?

A Not -- well, yes. With protein, with other proteins.

Q Which proteins?

A So-called zinc-finger proteins, the proteins I mentioned earlier on.

Q So you've done experiments where you used methods to determine in the human body where a protein is broken?

A Not in the human body, no. But in treatment with, with digestive enzymes figuring out where the protein is broken and what the products are.

MR. de LEEUW: We've been going, I think, for about 90 minutes. Why don't we take a, why don't we take a ten-minute break and then we'll resume.

THE WITNESS: Okay.

MR. de LEEUW: Sound good?

THE WITNESS: Sounds good.

VIDEO OPERATOR: The time is 11:23 a.m., and we are going off the record.

(Brief recess.)

VIDEO OPERATOR: The time is 11:40 a.m., and we are back on the record.

BY MR. de LEEUW:

Q Dr. Berg, I wanted to talk a bit about the blood-brain barrier. Could you explain what the

Q Okay. And once again, your general knowledge of the, of the gut-brain axis comes from where?

A Seminars that I've attended over, over years. I don't know if, both at -- probably, you know, at Pitt and at Hopkins and probably at NIH.

Q We covered a bit of this earlier. I just want to go through it in a bit more detail. Just because a mechanism of action for a compound is unknown does not mean that it has no therapeutic effect, correct?

A That's true.

Q And I assume that you're aware that drugs have been approved by the FDA without a known mechanism of action, true?

A True.

Q In fact, there's many drugs that have no known mechanism of action, right?

A I don't know about many, but, yes, there certainly are drugs.

Q And the FDA doesn't require that you have a mechanism of action to approve a drug; is that right?

MS. MATUSCHAK: Objection to the extent

that it's outside the scope of Dr. Berg's reports.

But you can answer.

BY MR. de LEEUW:

Q If you know.

A I don't have a detailed knowledge of that, but I believe that's correct.

Q Okay. And do you believe that a mechanism of action is required for a dietary supplement?

MS. MATUSCHAK: Same objection.

THE WITNESS: It's outside my expertise. But I don't believe it is.

BY MR. de LEEUW:

Q Okay. And it's not uncommon for scientists to observe phenomena without knowing what a mechanism of action is, right?

A Yes.

Q Okay. In fact, part of science is trying to determine the mechanism of action, right?

A That's true, yes.

Q You're aware that for a long period of time, there was no known mechanism of action for aspirin, right?

A Yes, that's true, although it's been known

for quite some time.

Q And were you aware that that's also true for acetaminophen?

A Yes.

Q And also ibuprofen?

A Yes.

Q And you're aware that that's also true for a whole class of antidepressants?

A Yes.

Q You would agree that for those compounds there, there are clinical impacts without a known method, mechanism of action, right?

A There's clinical impacts and also very strong evidence that they are effective.

Q What's a novel mechanism of action?

A Novel in this context would mean unusual or, or, you know, not well-precedented.

Q Did you consider the possibility in writing your report that metabolized components of apoaequorin could be actively transported?

A So the products of apoaequorin are peptides and amino acids, and there are certainly some peptides and amino acids that are actively transported. So, yes.

Q Did you consider whether apoaequorin could react with receptors either in the stomach or elsewhere in the mucus membranes of the GI tract?

A In principle, but there's, again, no biological reason that those receptors should be present for a protein that has no homolog in anything that we would normally come in contact with.

Q But your report didn't analyze that as a possible mechanism of action, right?

A I don't think I discussed that specifically, no.

Q And you didn't discuss whether or not a bioactive peptide could be actively transported, right?

A Well, active transport doesn't, that just relates to how -- again, the products are, proteins are peptides and amino acids. And those are, some of those are actively transported, but there's nothing specific.

Q And did you consider the possibility that apoaequorin could elicit a pharmacological signaling cascade from within the stomach?

A Again, there's no reason to think that

there should be any such signaling cascade. So I probably considered it, but ruled it out as being --

Q Sorry.

It's not addressed in your report; is that correct?

A I believe it's not addressed in my report.

Q What is a prodrug?

A A prodrug is a compound which is taken which is then converted by, typically, enzymes in your body into something that's actually the active compound that has the biological effect.

Q So it's taking one thing and then essentially the active ingredient is created in the stomach or in some part of the human?

A Yeah. I mean, it's typically more often in the liver or kidneys, but yes.

Q And have you studied prodrugs before?

A Not experimentally, but I have been involved in studies of the use of compounds which are prodrugs in humans, in populations since I've been at Pitt.

Q Your report does not address the possibility that apoaequorin or any metabolized components of apoaequorin could be transported or

absorbed and form a prodrug, did it?

A It did not. But again, the products are amino acids or -- amino acids or peptides. And I know of no examples where those are prodrugs.

Q Have you ever heard the phrase "competent and reliable scientific evidence"?

A I've heard the phrase. I don't know its technical meaning.

Q In your report at paragraph ten -- I'm sorry. Let me get there.

Actually, this is your rebuttal report. So JB-2, paragraph ten.

Are you there, paragraph ten?

A I am.

Q Okay. So this is a paragraph about -- and, again, I'm going butcher the pronunciation -- ziconotide? Is that right?

A Uh-huh.

Q Okay. And what is ziconotide?

A It's a small protein derived from marine cone snails, which has been, which blocks specific calcium channels. And it's been studied extensively and have proved as a medication for treatment of chronic pain.

C E R T I F I C A T E

COMMONWEALTH OF PENNSYLVANIA :

:

COUNTY OF PHILADELPHIA :

I, MAUREEN BRODERICK, Registered Professional Reporter - Notary Public, within and for the Commonwealth of Pennsylvania, do hereby certify that the proceedings, evidence, and objections noted are contained fully and accurately in the notes taken by me of the preceding deposition, and that this copy is a correct transcript of the same.

Dated: October 21st, 2021.

Maureen Broderick

MAUREEN BRODERICK

Registered Professional

Reporter - Notary Public

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SOUTHERN DISTRICT OF NEW YORK

FEDERAL TRADE COMMISSION and

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Case No. 1:17-cv-00124-LLS

ERRATA SHEET FOR JEREMY M. BERG, Ph.D.

I, Jeremy M. Berg, hereby make the following corrections to the transcript of my deposition, which occurred on October 8, 2021:

PAGE	LINE(S)	CORRECTION	REASON
44	19	"aequroin" should be "aequorin"	Spelling
51	2	"Simer [ph]" should be "Symer"	Spelling
51	3	"Densis [ph]" should be "Dintzis"	Spelling

56	11	"proteins in major peptides" should be "proteins and major peptides"	Typographical error
69	20	"SARS-Co-V-2" should be "SARS-CoV-2"	Spelling
70	24-25	"angiotensin 2 converting enzyme" should be "angiotensin converting enzyme 2"	Proper name of substance
96	15	"rebuttal article" should be "rebuttal report"	Proper name of the document

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on November 20, 2021.

JEREMY M. BERG, Ph.D.